

## CSCI 460: Operating Systems—Assignment 2 (8 marks)

This assignment is on process/thread synchronization. You will implement a variation of the Producer/Consumer problem. Assume the following:

- a. The buffer is a doubly linked list (for this assignment, let us assume that it contains at most 20 nodes). Each node has a random integer value (which should be less than 40). Initially the linked list contains 3 nodes.
- b. Producer #1 will generate a node and add it at the end of the linked list, the value of the new node is a random odd integer less than 40. Producer #2 will generate a node and add it at the end of the linked list, the value of the new node is a random even integer less than 40. When the buffer is full, both should generate a message and wait.
- c. Consumer #1 will delete, from the head of the list, the first node whose value is odd. Consumer #2 will delete, from the head of the list, the first node whose value is even. When the buffer is empty, both should generate a message and wait.

Each of the 4 processes/threads prints the contents of the linked list before and after it gets access to the linked list. Your output should contain the running result from every process/thread. **You must call `<pthread.h>` to use `pthread_create` to create a thread, etc, and you must implement your own protected linked list. Using an existing library/language which supports protected linked list operations, e.g. JAVA or C#, is forbidden.** (You might need to search the Internet to learn more about *pthread*. Due to the concurrency, if your program got stuck, analyze the reason from the output you have got.)

**Date Due: 11:30pm on Monday, October 24, 2016 (on or before 11:30pm, Oct 24, 2016).** Load your source code and output as two separate files on D2L in the folder **Assignment 2**, preferably in the form of **family\_name – 2.c** and **family\_name – 2.output** (assuming that you are using C).